DOCUMENT RESUME

ED 252 546 TM 840 805

AUTHOR Nerenz, Anne G.; Webb, Norman L.
TITLE Content Aggregations for Reading Skills and Mathematics for the Comparative Study of Phase IV of the IGE Evaluation Project. Phase IV, Project Paper 80-3.
INSTITUTION Wisconsin Univ., Madison. Research and Development Center for Individualized Schooling.
SPONS AGENCY National Inst. of Education (ED), Washington, DC.
PUB DATE Jun 80
GRANT OB-NIE-G-80-0117
NOTE 36p.; Figures and appendices marginally legible. For related documents, see TM 840 804-812 and TM 850 019.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Curriculum Evaluation; *Data Analysis; Data Collection; Elementary Education; Grade 2; Grade 5; *Individualized Instruction; *Instructional Materials; Mathematics Instruction; *Mathematics Skills; Programed Instruction; Reading Instruction; *Reading Skills
IDENTIFIERS Developing Mathematical Processes; *Individually Guided Education; Prereading Skills Program; Wisconsin Design for Reading Skill Development

ABSTRACT

This is one of a series of reports which provide definitions of and descriptive data on the variables used in the Comparative Study of Phase IV of the Individually Guided Education (IEG) Evaluation Project. Phase IV investigated three curriculum programs specifically designed to be compatible with instructional programming for the individual student: (1) the Wisconsin Design for Reading Skills Development (WDRSD); (2) Developing Mathematic Processes (DMP); and (3) Prereading Skills (PRS). Information on instructional methods and pupil outcomes for grades 2 and 5 was collected from achievement monitoring and domain referenced tests, teacher logs, and classroom observations. This report focuses on the procedures used in aggregating the reading skills and mathematics content areas. Data were grouped for analysis at three progressively more specific levels: content area; general objective; and specific objective. The content areas for reading skills were Word Attack, Comprehension, and Study Skills. The math skills content areas were Place Value and Numeration, Operations Fractions, Decimal Fractions, Measurement, and Problem Solving. Appendix A contains a listing of the reading skills and math content codes in the aggregated form. Each aggregated case contains 12 digits arranged in four three-digit fields. The fields represent the three grouping levels, and WDRSD or DMP skill and skill level. (BS)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

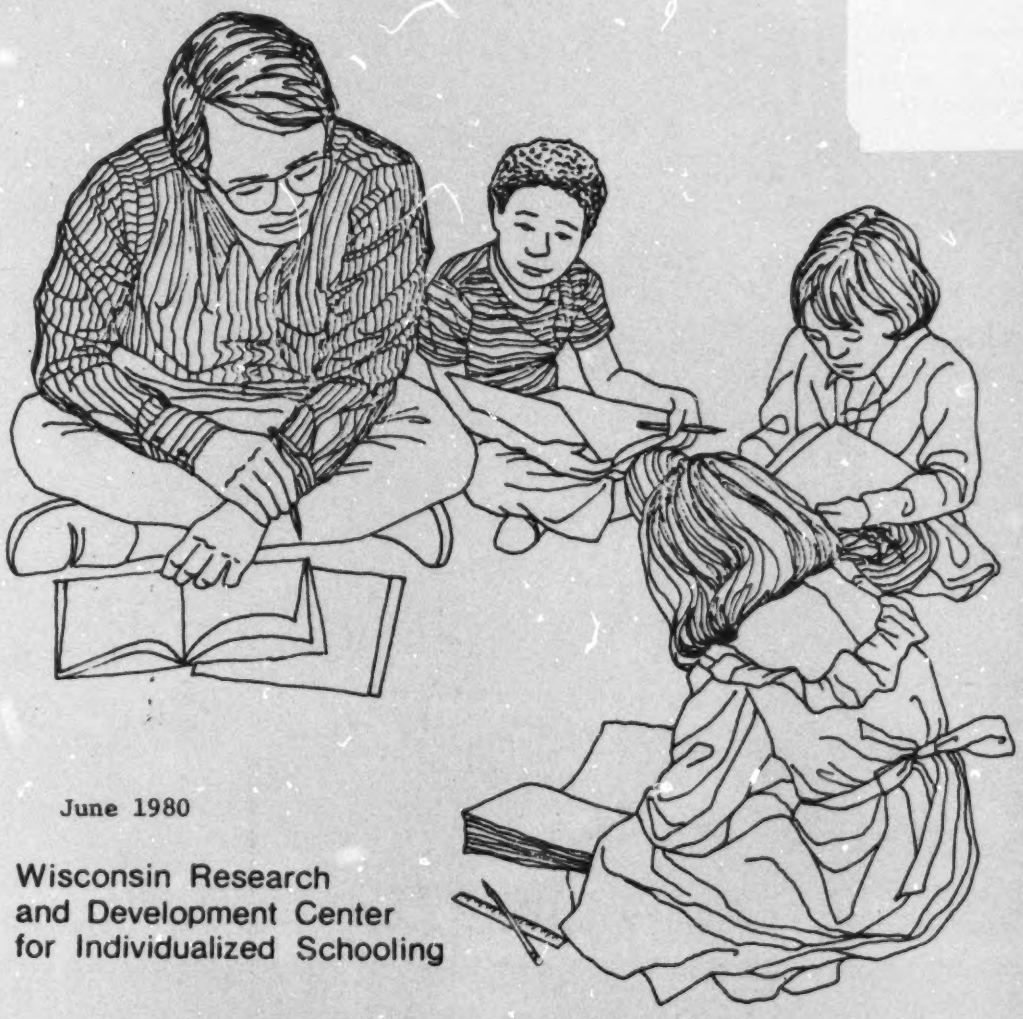
ED252546

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

Phase IV
Project Paper 80-3

CONTENT AGGREGATIONS FOR READING SKILLS AND MATHEMATICS FOR THE COMPARATIVE STUDY OF PHASE IV OF THE IGE EVALUATION PROJECT

by Anne G. Nerenz and Norman L. Webb



June 1980

Wisconsin Research
and Development Center
for Individualized Schooling

TM 840 805

Phase IV

Project Paper 80-3

CONTENT AGGREGATIONS FOR READING SKILLS AND MATHEMATICS FOR THE COMPARATIVE STUDY OF PHASE IV OF THE IGE EVALUATION PROJECT

by

Anne G. Nerenz
Norman L. Webb

Report from the
IGE Evaluation Project

Thomas A. Romberg
Work Group Chairman

Wisconsin Research and Development Center
for Individualized Schooling
The University of Wisconsin-Madison
Madison, Wisconsin

June 1979

Published by the Wisconsin Research and Development Center for Individualized Schooling. The project presented or reported herein was performed pursuant to a grant from the National Institute of Education, Department of Health, Education, and Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the National Institute of Education, and no official endorsement by the National Institute of Education should be inferred.

Center Grant No. OB-NIE-G-80-0117

BEST COPY AVAILABLE

MISSION STATEMENT

The mission of the Wisconsin Research and Development Center is to improve the quality of education by addressing the full range of issues and problems related to individualized schooling. Teaching, learning, and the problems of individualization are given concurrent attention in the Center's efforts to discover processes and develop strategies and materials for use in the schools. The Center pursues its mission by

- conducting and synthesizing research to clarify the processes of school-age children's learning and development
- conducting and synthesizing research to clarify effective approaches to teaching students basic skills and concepts
- developing and demonstrating improved instructional strategies, processes, and materials for students, teachers, and school administrators
- providing assistance to educators which helps transfer the outcomes of research and development to improved practice in local schools and teacher education institutions

The Wisconsin Research and Development Center is supported with funds from the National Institute of Education and the University of Wisconsin.

WISCONSIN RESEARCH AND DEVELOPMENT
CENTER FOR INDIVIDUALIZED SCHOOLING

Table of Contents

		Page
	List of Figures	vii
	Abstract	ix
	Introduction	1
I	Aggregation Procedures	3
II	Aggregated Content Files	19
	Appendix A	21
	Reading Content Aggregation for Grades 2 and 5	23
	Grade 2 Math Content Aggregations	25
	Grade 5 Math Content Aggregations	27
	References	29

List of Figures

Figure		Page
1	Content aggregations for grade 2 and grade 5 word attack skills	4
2	Content aggregations for grade 2 and grade 5 study skills	5
3	Content aggregations for grade 2 and grade 5 comprehension skills	6
4	Grade 2 mathematics content aggregations	11
5	Grade 5 mathematics content aggregations	12

Abstract

This report is one in a series of papers which provide definitions of and descriptive data on the variables used in the Comparative Study of Phase IV of the IGE Evaluation Project. Specifically, the procedures used to aggregate the reading skills and mathematics content areas are discussed in this report. A more detailed discussion of the design of the study and the application of the content aggregations to the test, log and observation data is available in Report 80-2 (Romberg, Webb, Stewart and Nerenz) and readers might find that paper helpful in understanding the information presented here.

Introduction

The IGE Evaluation Project has as a central objective the identification of features of IGE schooling which contribute to successful instruction, especially in reading skills and mathematics. Although the first four phases of this project focused on different aspects of IGE, they were designed to provide complimentary data bases resulting in a comprehensive description of this form of schooling. With this goal in mind Phase IV was designed to supplement information collected in Phases I and III by providing detailed information on a small number of curricular and instructional variables. That is, whereas these phases investigated organizational, system, general means of instruction, and general achievement variables, the main purpose of Phase IV was to investigate the three R & D Center produced curriculum programs whose instructional procedures and materials were specifically designed to be compatiable with instructional programming for the individual student. These programs are the Wisconsin Design for Reading Skills Development (WDRSD) (Otto, 1977); Developing Mathematical Processes (DMP) (Romberg, 1977); and Pre-reading Skills (PRS), (Venezky and Pittelman, 1977).

Phase IV was divided into two parts--the Descriptive Study and the Comparative Study--and information on the design and procedures used during each portion may be found in Project Paperes 79-42 and 80-2 (Webb and Romberg, 1979; Romberg, Webb, Stewart and Nerenz, 1980). Briefly, each part was designed to provide detailed information on two variables--means of instruction and pupil outcomes--using

achievement monitoring and domain referenced tests, teacher logs, and classroom observations. In addition, a smaller amount of information on background, organizational, and program variables was obtained using principal, unit leader, and teacher interviews. This report focuses on the procedures used in aggregating the reading skills and mathematics content which was included on the tests and recorded on both the observations and the teacher logs.

I

Aggregation Procedures

Reading Content Aggregations

In the Comparative Study of Phase IV, information on the content taught during reading skills instruction was obtained from the teacher logs, classroom observations, and achievement monitoring tests. These data were grouped for analysis at three progressively more specific levels. The most inclusive is the "content area," followed by the "general objective" and the "specific objective."

As outlined in the Wisconsin Design for Reading Skills Development (WDRSD) (Otto, 1977), reading skills may be organized into three domains: Word Attack, Comprehension, and Study Skills. Within each of these content areas, from one to six general objectives were developed. These content areas, general objectives, and the specific objectives which they represent are described below. The Word Attack, Comprehension, and Study Skills aggregations for Grades 2 and 5 are shown in Figures 1, 2, and 3.

Phonic Analysis-Consonants. Phonic Analysis-Consonants focuses on consonant sounds in real or nonsense words. Sounds may be in the initial or final position and include single consonants, two- and three-letter consonant blends, variant consonant sounds, and consonant digraphs. This general objective includes one specific objective and eight reading skills (B3, B4, B5, B8, C2, C3, C12, D2).

General Objective		Specific Objective			
Case Number	Descriptor	Case Number	Descriptor	Case-Skill	Descriptor
01	Phonic Analysis-Consonants	01	Phonic Analysis-Consonants	111 C 2	Consonants and their variant sounds
				112 D 2	Three-letter consonant blends
				113 B 1	Beginning consonant sounds
				B 4	Ending consonant sounds
				B 5	Two-letter blends
				C 3	More difficult two-letter blends
				B 8	Simple consonant digraphs
				C12	Consonant digraphs
02	Phonic Analysis-Vowels	02	Phonic Analysis-Vowels	114 C 4	Long vowel sounds
				115 C 6	Diphthongs ew, oi, oy, ow
				121 C 7	Long and short oo
				122 C 8	Short vowel generalization
				123 C11	Final vowel generalization
				124 B 7	Short vowels
				C 5	Vowel + r, a + l, a + w
				C 9	Silent e generalization
				C10	Two vowels together
03	Phonic Analysis-Silent Letters	03	Phonic Analysis-Silent Letters	125 D 3	Silent letters
04	Structural Analysis	04	Structural Analysis	131 B10	Contractions
				132 B11	Base words and endings
				133 B13	Possessive forms of nouns
				141 D 4	Syllabication
				142 D 5	Accent
				143 D 7	Possessive forms
				144 B 6	Rhyming elements
				B 9	Compound words
				B12	Plurals
				C14	More difficult plural forms
				C13	Base words with prefixes and suffixes
				C15	Homonyms
				D 6	Unaccented schwa
05	Vocabulary Meaning	05	Vocabulary Meaning	134 C16	Synonyms and antonyms
				135 C18	Multiple meanings
				145 B 1	Sight vocabulary
				C 1	Sight vocabulary
				D 1	Sight vocabulary

Figure 1. Content aggregations for grade 2 and grade 5 word attack skills.

BEST COPY AVAILABLE

General Objective		Specific Objective			
Case Number	Descriptor	Case Number	Descriptor	Case-Skill	Descriptor
06	Map Skills	06	Representation	211 B 1	Uses picture symbols to interpret maps
				212 C 1	Uses non-pictorial symbols to interpret maps
				213 D 1	Uses point and line symbols to interpret maps
				214 E 1	Uses point, line, and area symbols
				C 2	Uses a color key to interpret maps
				F 1	Analyzes maps of two or more areas
				G 1	Synthesizes information about an area
		07	Orientation	215 B 2	Locates points on simple picture grids
				221 C 3	Locates points on number-letter grids
				222 E 2	Determines intermediate directions
				223 D 2	Indicates cardinal directions on globes
				F 2	Uses various projections
				G 2	Uses latitude and longitude
				G 3	Determines direction on any projection
		08	Measurement	224 C 5	Expresses relative distance
				225 D 3	Uses scale to determine whole units of distances
				231 E 3	Makes limited use of scale to determine distances
				232 F 4	Compares maps drawn to different scales
				233 B 3	Determines relative distance
				C 4	Compares sizes
				F 3	Uses inset maps to determine relative sizes of areas
				G 4	Uses scale to determine distances
07	Graph and Table Skills	09	Graphs	234 B 4	Compares amounts
				235 C 6	Extracts directly
				241 C 7	Determines differences between numbers extracted
				D 4	Determines differences between numbers extracted
				242 D 5	Extracts by interpolating
				243 E 4	Determines differences between numbers extracted
				244 F 5	Determines differences between numbers extracted
				G 5	Determines differences between numbers extracted
				245 F 5	Determines purposes and makes summary statements
				G 6	Makes projections and relates information
		10	Tables	251 C 8	Compares amounts
				252 C 9	Locates cells
				253 D 6	Determines relationships between cells
				254 E 6	Determines relationships between cells
				255 E 7	Determines purposes and makes summary statements
				311 F 6	Determines relationships between cells on schedules
				G 7	Solves problems on schedules
08	Reference Skills	11	Alphabetizing	322 C11	Applies basic alphabetizing skills
				323 D10	Applies alphabetizing skills
				324 D11	Uses guide words in simple reference books
				E12	Uses guide words and guide letters
		12	Dictionary Skills	313 E 9	Uses dictionaries independently
				314 F 8	Uses dictionaries for pronunciation
		13	Locating Information in Books	312 D 7	Begins to use indexes
				315 C10	Develops book skills
				D 8	Has beginning dictionary and glossary skills
				D 9	Uses tables of contents
				E 8	Refines use of indexes
				E10	Uses cross references
				321 F 7	Uses Subject Index
				G 8	Uses Readers' Guide
				343 D12	Uses headings and sub-headings
				345 F12	Uses catalog cards to select materials
		14	Locating Specialized Information	325 E13	Uses guide cards in catalog drawers
				331 F 9	Uses catalog card filing rules
				332 F10	Uses Dewey Decimal System
				G 9	Uses card catalog
		15	Recording	334 E14	Takes notes
				335 F11	Has beginning outlining skills
				341 G10	Makes formal outlines
		16	Evaluation	342 D13	Selects relevant sources
				E11	Uses a variety of sources
				E15	Selects specialized reference books
				E16	Considers special features of books
				343 D14	Recognizes printed statements may be fact or opinion
				344 E17	Checks facts from two sources

Figure 2. Content aggregations for grade 2 and grade 5 study skills.

BEST COPY AVAILABLE

General Objective		Specific Objective			
Case Number	Descriptor	Case Number	Descriptor	Case-Skill	Descriptor
09	Word Meaning Skills	17	Word Parts	411 F 1	Suffixes
				412 E 1	Prefixes
				G 1	Combining forms
				G 2	Word roots
		18	Context Clues	413 F 2	Indirect context clues: application
				414 D 1	Identifies direct context clues
				E 2	Identifies direct context clues: application
				G 3	Identifies direct context clues: obscure meanings
10	Sentence Meaning Skills	19	Detail	415 C 1	Notes detail in positive and negative sentences
				421 B 1	Notes detail
				D 2	Notes detail in active and passive voice sentences
				F 3	Notes detail in sentences with more than one subordinate clause
		20	Parphrase	422 F 3	Paraphrases complex sentences with two or more prepositional phrases
				423 C 2	Pharaphrases positive and negative sentences
				D 3	Pharaphrases active and passive voice sentences
				F 4	Paraphrases complex sentences
				G 4	Rewrites sentences
11	Passage Meaning Skills	21	Central Thought	424 C 3	Identifies a topic without organizer
				425 F 4	Identifies central thought without organizer
				431 B 2	Identifies a topic with organizer
				D 4	Identifies relevant information
				E 5	Identifies central thought with organizer
				G 5	Generates central thought
		22	Reasoning	432 C 4	Identifies conclusions: one relationship
				433 F 5	Identifies conclusions: indirect relationships
				434 B 3	Predicts outcomes
				D 5	Identifies cause-effect relationship
				E 6	Identifies conclusions: direct relationships
				G 6	Recognizes supported and unsupported conclusions
				G 7	Modifies conclusions
		23	Sequence	435 C 5	Event before or after
				441 F 6	Implicit clues
				442 B 4	Event before
				B 5	Event after
				D 6	Calendar markers
				E 7	Explicit clues
				G 8	Implied and stated events
12	General Reading	24	General Reading	443	Self-directed reading
				444	Interpretive reading
				445	Creative reading

Figure 3. Content aggregations for grade 2 and grade 5 comprehension skills.

BEST COPY AVAILABLE

Phonic Analysis-Vowels. In this general objective, children were to attend to vowels in real or nonsense words. Long and short vowels, vowels in the final position, vowels plus r, l, or w, two vowels together, and vowel combinations including diphthongs were considered. This objective included nine word attack skills (B7, C4-C11).

Phonic Analysis-Silent Letters. This general objective includes a single specific objective (D3) in which children were asked to identify silent letters and pronounce words containing them. Particular attention is given to seven high frequency consonant combinations (kn, gn, wr, mb, bt, igh, tch), although silent vowels are also considered.

Structural Analysis. Reading skills in this general objective deal with word structure, and children were asked to identify and use particular inflected forms. The specific objective includes skills in seven areas: possessives (B13, D7), rhymes (B6), word structure (B9, B11, C13), plurals (B12, C14), contractions (B10), word analysis (D4, D5, D6), and special meanings (C15).

Vocabulary Meaning. Skills included in this general objective deal with the meaning of words, generally in a particular context. Data were obtained for three specific word attack skills: synonyms and antonyms (C16), multiple meanings (C18), and sight vocabulary (B1, C1, D1).

Study Skills

Map Skills. This general objective is designed to provide students with skills in deriving information from maps. It includes instruction

in interpreting pictorial and non-pictorial symbols, using color keys, analyzing maps and synthesizing information, using grids, applying conventional directional systems, using latitudinal and longitudinal information, measuring size and distance, and using various scaling units. Specific objectives include: representation (B1, C1, C2, D1, E1, F1, G1), orientation (B2, C3, D2, E2, F2, G2, G3), and measurement (B3, C4, C5, D3, E3, F3, F4, G4).

Graph and Table Skills. Helping children interpret graphs and tables is the focus of this general objective. Instruction in comparison and direct extraction, manipulation of extracted values, location and comparison of cells, and development of purpose and summary statements is included. The specific objectives are: graphs (B4, C6, C7, D4, D5, E4, E5, F5, G5, G5) and tables (C8, C9, D6, E6, E7, F6, G7).

Reference Skills. Skills in this general objective focus on locating and deriving meaning from varied standard reference sources and on recording and evaluating the obtained information. There are six specific objectives: alphabetizing (C11, D10, D11, D12), dictionary skills (E9, F8), locating information in books (C10, D7, D8, D9, D12, E8, E10, F7, F12, G8), locating specialized information (E13, F9, F10, G9), recording (E14, F11, G10), and evaluation (D13, D14, E11, E15, E16, E17).

Comprehension

Word Meaning Skills. The first general objective in the Comprehension Content Area deals with skills which help children derive meaning

from unfamiliar words. Both word analysis and contextual strategies are included. The specific objectives are: word parts (E1, F1, G1, G2) and context clues (D1, E2, F2, G3).

Sentence Meaning Skills. This general objective focuses on skills which are useful in understanding sentences of varied complexity in short written selections. Two specific objectives are included: detail (B1, C1, D2, E3) and paraphrase (C2, D3, E4, F3, G4).

Passage Meaning Skills. Instruction in passage meaning skills is designed to help children derive meaning from longer texts, presented either orally or in writing. Children are to focus on the central thought in passages with and without an organizer, on the sequence of events, and on the validity of outcomes or conclusions. This general objective includes instruction in three specific domains: central thought (B2, C3, D4, E5, F4, G5), reasoning (B3, C4, D5, E6, F5, G6, G7), and sequence (B4, B5, C5, D6, E7, F6, G8).

General Reading Skills. This general objective represents a single specific objective and includes instruction in the three "expressive" elements of the WDRSD (Creative, Interpretive, and Self-directed Reading) and in more general enrichment and application activities.

Math Aggregations

Information on the content taught during instruction was obtained from the teacher logs, classroom observations, and achievement monitoring and domain referenced tests. As part of the analyses, the data on

math objectives were aggregated to form composite groupings of objectives with the most inclusive being the content area followed by the general objective level and then the specific objective level. The aggregations of objectives for Grade 2 and Grade 5 are in Figures 4 and 5.

Grade 2

Place Value and Numeration

The content area includes three general objectives: Writing Numbers, Inequalities, and Other Place Value or Numeration. The Writing Numbers objective requires students to count the number of objects in a set and then write or recognize the appropriate numeral. Specifically, it includes compact, grouping, and expanded notations. The Inequalities objective focuses on ordering whole numbers, usually in sets of three, using appropriate symbols. Other Place Value or Numeration objectives include any other objectives asking students to identify and specify place values, count, or write the numerical value of sets of objectives or measurements.

Operations

The operations content area focuses on the manipulation of whole numbers using addition/subtraction or multiplication. For each of these two general objectives, children were to solve open sentences or

Content		General Objective		Specific Objective		Objective
Case Number	Descriptor	Case Number	Descriptor	Case Number	Descriptor	Case Number
01	Place value and Numeration	01	Writing numbers	01	Compact notation	11
				02	Compact notation 100-999	12
				03	Grouping or expanded notation	13
		02	Inequalities	04	Order numbers	14
				05	Other (symbols, order sentences)	15
		03	Other place value or numeration	06	Other place value or numeration (i.e. reads)	21
02	Operations (whole numbers)	04	Addition/ Subtraction	07	Computes sum 0-99	22
				08	Computes difference 0-99	23
				09	Solves open sentence 0-20	24
				10	Solves open sentence 0-99	25
		05	Multiplication	11	Computes product 0-100	31
03	Fractions	06	Fractions	12	Represents fractional names	32
				13	Identifies fractional part	33
				14	Other	34
04	Decimal Fractions					
05	Measurement	07	Measurement	15	Length	35
				16	Capacity	41
06	Problem Solving	08	Word Problems	17	Writes sentence 0-99	42
				18	Solves word problems	43
		09	Applications	19	Solves application problems	44
07	Geometry	10	Geometry	20	Geometry	45
08	Miscellaneous	11	Miscellaneous	21	Time, money, tables, graphs, properties, attributes	51

Figure 4 Grade 2 mathematics content aggregations.

BEST COPY AVAILABLE

BEST COPY AVAILABLE

Content		General Objective		Specific Objective		Objective
Case Number	Descriptor	Case Number	Descriptor	Case Number	Descriptor	Case Number
01	Place value and Numeration					
02	Operations	01	Addition/ Subtraction	01	Computes sum 0-99,999	34
				02	Computes difference of 3 to 5 digit numbers	35
		02	Multiplication	03	Finds product 0-9,999	32
				04	Finds product 0-999,999	33
		03	Division	05	Divides by 1-digit using algorithm	25
				06	Divides 3-digit numbers by 2-digits	31
03	Fractions	04	Concept	07	Concept	11
				08	Equivalent fractions	12
				09	Orders fractions	13
		05	Computes	10	Solves fraction sentences (+ or -)	14
				11	Solves a x b = □ involving fractions	15
04	Decimal fractions	06	Concept	12	States equivalent decimal for common fraction	21
		07	Computes	13	Finds product of whole number and decimal	22
				14	Computes decimal sum	23
				15	Computes decimal difference	24
05	Measurement	08	Measurement	16	Measurement	43
06	Problem Solving	09	Word Problems	17	Writes a number sentence	44
				18	Solves word problems	45
		10	Applications	19	Solves application problems	51
07	Geometry	11	Geometry	20	Geometry	42
08	Miscellaneous	12	Miscellaneous	21	Other Computations	41
				22	Numeration system, place value, number theory, graphs, tables	52

Figure 5 Grade 5 mathematics content aggregations.

to compute sums, differences, or products given two or more numbers to be added, subtracted, or multiplied. The numbers used in all computations ranged from 0 to 100.

Fractions

This content area and its general objective reguire the student to understand the basic concept of a fraction. Specifically, children are to identify a fractional part of a set or area and to use fractions in other elementary contexts.

Decimal Fractions

This general objective includes all objectives that involve decimal fractions. The general objective is not subdivided into specific objective levels since decimals are generally not taught at Grade 2.

Measurement

Measurement includes objectives that involve the assigning of a standard measure to a physical object or picture. The two dimensions of measurement which are included in this area are length and capacity.

Problem Solving

This content area includes two objectives--Word Problems and Applications--in which students were asked to find the solution to a verbal or pictorial problem. Word problems were stated in two or three units and could be solved by writing and then solving a mathematical

sentence. Word problems were mainly restricted to one-step problems requiring the student to add or subtract two numbers. Unlike the Word Problems, Applications Problems require the student to apply and combine different computing skills and more than one operation and step is generally necessary.

Geometry

Objectives concerning geometric shapes, movement or direction on a grid, and transformation of figures are included in this general objective.

Miscellaneous

This general objective includes any objective that cannot be classified under one of the other general objectives, such as time and money.

Grade 5

Although the Grade 5 content is aggregated into the same content areas which were used at Grade 2, the general and specific objectives are different, as outlined below.

Place Value and Numeration

This content area includes all objectives related to place value, counting with whole numbers, using different notational forms (compact, grouping, and expanded notation), and number theory (primes, odd, even, lowest common denominator).

Operations

The Operations content area focuses on three general objectives: Addition/subtraction, Multiplication, and Division. The objectives included in this content area require students to apply computational algorithms and recall basic facts. The objectives include finding sums with numbers from 0-99,999, finding the difference of 3- to 5-digit numbers, finding products up to 999,999, and dividing 3-digit numbers by 2-digit numbers.

Fractions

The Fractions content area includes objectives pertaining to fractions in a ratio form ($\frac{a}{b}$). The content area is divided into two general objectives. The Concept area includes general understanding and representation of equivalent forms, and ordering of fractions. The Computes general objective includes solving addition, subtraction, and multiplication sentences involving fractions.

Decimal Fractions

The Decimal Fractions content area involves fractions in decimal form. The two general objectives focus on concepts and computations with decimal fractions. The Concept general objective includes finding an equivalent decimal form for common fractions. The Computes general objective includes finding the product of a whole number with a decimal, finding a sum of two or more decimal numbers, and finding a difference using two decimal numbers.

Measurement

All objectives dealing with measurement (lengths, areas, and volumes) are included under the general objective.

Problem Solving

The Problem Solving content area includes objectives that are divided into two general areas. Word Problems require students to solve problems that are generally stated in two or three lines and whose solution can be found by writing and then solving a sentence. Applications require students to apply or combine different computing skills in solving problems and usually require more than one operation or step.

Geometry

All objectives relating to geometry are classified under this content area, including objectives regarding geometric shapes, movement or direction on a grid, or the transformation of figures.

Miscellaneous

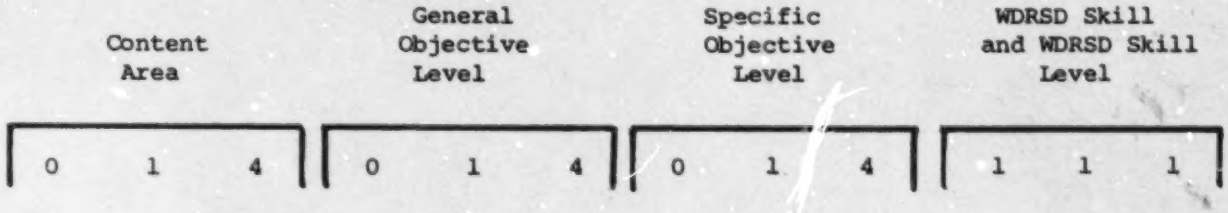
The miscellaneous content area includes any objective that cannot be classified under one of the other content areas. The area is subdivided at the specific objective level into two classes of objectives. Other Computations include objectives where students are asked to compute averages or percentages and to use processes which are not directly

related to the objectives under the Operations content area. Other Miscellaneous includes such objectives as numeration systems, number theory, or graphs and tables.

II

Aggregated Content Files

A listing of the reading skills and math content codes in their aggregated form is included in Appendix A. Each aggregated case contains 12 digits arranged in four three-digit fields as shown below.



For the reading skills content aggregations, the first two digits represent the content area (01 - Word Attack; 02 - Study Skills; 03 - Comprehension) and are followed by a 4. This digit was used as a place holder in columns three, six, and nine in order to maintain a comparable format in the reading and mathematics file. The next two columns refer to the General Objective level (01-12) and the seventh and eighth digits represent one of the 24 Specific Objectives. Individual reading skills from the WDRSD program are represented by the last three digits in each case.

Similarly the first two digits of the math content cases represent the Content Area with columns four and five representing the General Objective, seven and eight the Specific Objective, and ten and eleven the DMP objective. The third digit in each field (columns 3, 6, 9, and

12) represents the type of lesson:

1 - preparatory lessons

2 - regular lessons

3 - review lessons

A 4 in these columns represents the sum of preparatory, regular, and review times.

APPENDIX A

Listings of the Aggregated Content Files
for Grade 2 and Grade 5
for Reading Skills and Math Instruction

GXREAD

1 0140140141 11
2 0140140141 12
3 0140140141 13
4 0140240241 14
5 0140240241 15
6 0140240241 21
7 0140240241 22
8 0140240241 23
9 0140240241 24
10 0140340341 25
11 0140440441 31
12 0140440441 32
13 0140440441 33
14 0140440441 41
15 0140440441 42
16 0140440441 43
17 0140440441 44
18 0140540541 34
19 0140540541 35
20 0140540541 45
21 0240640642 11
22 0240640642 12
23 0240640642 13
24 0240640642 14
25 0240640742 15
26 0240640742 21
27 0240640742 22
28 0240640742 23
29 0240640842 24
30 0240640842 25
31 0240640842 31
32 0240640842 32
33 0240640842 33
34 0240740942 34
35 0240740942 35
36 0240740942 41
37 0240740942 42
38 0240740942 43
39 0240740942 44
40 0240740942 45
41 0240741042 51
42 0240741042 52
43 0240741042 53
44 0240741042 54
45 0240741042 55
46 0240741043 11
47 0240841143 22
48 0240841143 23
49 0240841143 24
50 0240841243 13
51 0240841243 14
52 0240841343 12
53 0240841343 15

BEST COPY AVAILABLE

BEST COPY AVAILABLE

Reading Content Aggregation for Grades 2 and 5 (continued)

24

54 024084134321
55 024084134333
56 024084134335
57 024084144325
58 024084144331
59 024084144332
60 024084154334
61 024084154335
62 024084154341
63 024084164342
64 024084164343
65 024084164344
66 034094174411
67 034094174412
68 034094184413
69 034094134414
70 034104194415
71 034104194421
72 034104204422
73 034104204423
74 034114214424
75 034114214425
76 034114214431
77 034114224432
78 034114224433
79 034114224434
80 034114234435
81 034114234441
82 034114234442
83 034124244443
84 034124244444
85 034124244445
86 044134254770*
87 044134254771
88 044134254772
89 044134254773
90 044134254774
91 044134254775
92 044134254776
93 054144264660
94 054144264661
95 054144264662
96 054144264663
97 054144264664
98 054144264665
99 054144264666
100 054144264667
101 054144264668

*Content areas 04 and 05 refer to Non-applied Time categories from the observations and Off-time categories from the teacher logs and thus no reading skills or mathematics objectives are directly associated with them.

BEST COPY AVAILABLE

Grade 2 Math Content Aggregations

G2MATH

1 011011011111
2 012012012112
3 013013013113
4 014014014114
5 011011021121
6 012012022122
7 013013023123
8 014014024124
9 011011031131
10 012012032132
11 013013033133
12 014014034134
13 011021041141
14 012022042142
15 013023043143
16 014024044144
17 011021051151
18 012022052152
19 013023053153
20 014024054154
21 011031061211
22 012032062212
23 013033063213
24 014034064214
25 021041071221
26 022042072222
27 023043073223
28 024044074224
29 021041081231
30 022042082232
31 023043083233
32 024044084234
33 021041091241
34 022042092242
35 023043093243
36 024044094244
37 021041101251
38 022042102252
39 023043103253
40 024044104254
41 021051111311
42 022052112312
43 023053113313
44 024054114314
45 031061121321
46 032062122322
47 033063123323
48 034064124324
49 031061131331
50 032062132332
51 033063133333
52 034064134334
53 031061141341

26

54 032062142342
55 033063143343
56 034064144344
57 041
58 042
59 043
60 044
61 051071151351
62 052072152352
63 053073153353
64 054074154354
65 051071161411
66 052072162412
67 053073163413
68 054074164414
69 061081171421
70 062082172422
71 063083173423
72 064084174424
73 061081181431
74 062082182432
75 063083183433
76 064084184434
77 061091191441
78 062092192442
79 063093193443
80 064094194444
81 071101201451
82 072102202452
83 073103203453
84 074104204454
85 081111211511
86 082112212512
87 083113213513
88 084114214514
89 094124224770*
90 094124224771
91 094124224772
92 094124224773
93 094124224774
94 094124224775
95 094124234776
96 104134244661*
97 104134244662
98 104134244663
99 104134244664
100 104134244665
101 104134244666
102 104134244667
103 104134244668
104 114144254655*

* Content areas 09 and 10 are Non-applied Time and Off-time categories. Content area 11 is general math testing.

BEST COPY AVAILABLE

BEST COPY AVAILABLE

Grade 5 Math Content Aggregations

G5MATH

```
 1 011
 2 012
 3 013
 4 014
 5 021011011341
 6 022012012342
 7 023013013343
 8 024014014344
 9 021011021351
10 022012022352
11 023013023353
12 024014024354
13 021021031321
14 022022032322
15 023023033323
16 024024034324
17 021021041331
18 022022042332
19 023023043333
20 024024044334
21 021031051251
22 022032052252
23 023033053253
24 024034054254
25 021031061311
26 022032062312
27 023033063313
28 024034064314
29 031041071111
30 032042072112
31 033043073113
32 034044074114
33 031041081121
34 032042082122
35 033043083123
36 034044084124
37 031041091131
38 032042092132
39 033043093133
40 034044094134
41 031051101141
42 032052102142
43 033053103143
44 034054104144
45 031051111151
46 032052112152
47 033053113153
48 034054114154
49 041061121211
50 042062122212
51 043063123213
52 044064124214
53 041071131221
```

28

54 042072132222
55 043073133223
56 044074134224
57 041071141231
58 042072142232
59 043073143233
60 044074144234
61 041071151241
62 042072152242
63 043073153243
64 044074154244
65 051081161431
66 052082162432
67 053083163433
68 054084164434
69 061091171441
70 062092172442
71 063093173443
72 064094174444
73 061091181451
74 062092182452
75 063093183453
76 064094184454
77 061101191511
78 062102192512
79 063103193513
80 064104194514
81 071111201421
82 072112202422
83 073113203423
84 074114204424
85 081121211411
86 082122212412
87 083123213413
88 084124214414
89 081121221521
90 082122222522
91 083123223523
92 084124224524
93 094131231779
94 094131234771
95 094131234772
96 094131234773
97 094131234774
98 094134234775
99 094131234776
100 104144251651
101 104144251652
102 104144251653
103 104144251654
104 104144251655
105 104144254656
106 104144254657
107 104144254658
108 114154264555

BEST COPY AVAILABLE

References

Otto, W. The Wisconsin Design: A reading program. In H. J. Klausmeier, R. A. Rossmiller, & M. Saily (Eds.), Individually guided education: Concepts and practices. New York: Academic Press, 1977.

Romberg, T. A. Developing Mathematical Processes: The elementary mathematics program for Individually Guided Education. In H. J. Klausmeier, R. A. Rossmiller, & M. Saily (Eds.), Individually guided education: Concepts and practices. New York: Academic Press, 1977.

Romberg, T. A., Webb, N. L., Stewart, D. M., and Nerenz, A. G. Design for the Comparative Study of Reading Skills and Mathematics Curriculum Products of Phase IV of the IGE Evaluation Project. Project Paper No. 80-2. Madison: Wisconsin Research and Development Center for Individualized Schooling, 1980.

Venezky, R. L., & Pittelman, S. P. PRS: A Prereading Skills Program for Individually Guided Education. In H. J. Klausmeier, R. A. Rossmiller, & M. Saily (Eds.), Individually guided elementary education: Concepts and practices. New York: Academic Press, 1977.

Webb, N. L. & Romberg, T. A. The Design for the Study of Reading Skills and Mathematics Curriculum Products IGE Evaluation Project--Phase IV. Project Paper 79-42. Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979.

Center Planning and Policy Committee

Richard A. Rossmiller
Wayne Otto
Center Co-Directors

Dale D. Johnson
Area Chairperson
Studies in Language:
Reading and Communication

Marvin J. Fruth
Area Chairperson
Studies in Implementation
of Individualized Schooling

Penelope L. Peterson
Area Chairperson
Studies of Instructional Programming
for the Individual Student

James M. Lipham
Area Chairperson
Studies of Administration and
Organization for Instruction

Thomas A. Romberg
Area Chairperson
Studies in Mathematics and Evaluation
of Practices in Individualized Schooling

Associated Faculty

Vernon L. Allen
Professor
Psychology

B. Dean Bowles
Professor
Educational Administration

Thomas P. Carpenter
Associate Professor
Curriculum and Instruction

W. Patrick Dickson
Assistant Professor
Child and Family Studies

Lloyd E. Frohreich
Associate Professor
Educational Administration

Marvin J. Fruth
Professor
Educational Administration

Dale D. Johnson
Professor
Curriculum and Instruction

Herbert J. Klausmeier
V.A.C. Henmon Professor
Educational Psychology

Joel R. Levin
Professor
Educational Psychology

James M. Lipham
Professor
Educational Administration

Dominic W. Massaro
Professor
Psychology

Donald M. McIsaac
Professor
Educational Administration

Wayne Otto
Professor
Curriculum and Instruction

Penelope L. Peterson
Assistant Professor
Educational Psychology

Thomas S. Popkewitz
Professor
Curriculum and Instruction

Gary G. Price
Assistant Professor
Curriculum and Instruction

W. Charles Read
Professor
English and Linguistics

Thomas A. Romberg
Professor
Curriculum and Instruction

Richard A. Rossmiller
Professor
Educational Administration

Peter A. Schreiber
Associate Professor
English and Linguistics

B. Robert Tabachnick
Professor
Curriculum and Instruction

Gary G. Wehlage
Professor
Curriculum and Instruction

Louise Cherry Wilkinson
Associate Professor
Educational Psychology

Steven R. Yussen
Professor
Educational Psychology

11/79